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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/635,344	08/06/2003	Alan E. Delahoy	ENP1 0101 PUS	8089
22045	7590	04/18/2005	EXAMINER	
BROOKS KUSHMAN P.C. 1000 TOWN CENTER TWENTY-SECOND FLOOR SOUTHFIELD, MI 48075			VERSTEEG, STEVEN H	
			ART UNIT	PAPER NUMBER
			1753	

DATE MAILED: 04/18/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/635,344

Applicant(s)

DELAHOY ET AL.

Examiner

Steven H. VerSteeg

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 March 2005.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-54 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-15, 17-43 and 45-54 is/are rejected.
- 7) ☒ Claim(s) 16 and 44 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 06 August 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 2/28/05.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

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DETAILED ACTION

Drawings

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: **36** (see page 9, line 30); **100** (see page 13, line 27); and **102** (see page 13, line 28). Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

2. The disclosure is objected to because of the following informalities: "comprising comprising" needs corrected on page 12 at line 23.

Appropriate correction is required.

Claim Objections

3. Claim 17 is objected to because of the following informalities: "block" needs inserted after "second insulating" in claim 17 at line 3. Appropriate correction is required.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1-9, 11-15, 18-26, 29-34, 36-43, 45, and 46 are rejected under 35 U.S.C. 102(b) as being anticipated by US 6,150,030 to Stollenwerk et al. (Stollenwerk).

6. For claim 1, Applicant requires a method for sputter coating a substrate in a sputter coating reactor comprising providing a channel for gas to flow through wherein one or more portions of the channel surface includes at least one target material; flowing gas through the channel wherein at least a portion of the gas is non-laminarly flowing; and generating a plasma wherein the target material is sputtered off the channel surface to form a gaseous mixture containing target atoms that is transported to the substrate.

7. For claim 22, Applicant requires a method for depositing an oxide film on a substrate in a sputter coating reactor comprising providing a channel for a working gas to flow through that has the channel defined by at least one target material; flowing the working gas through the channel non-laminarly; generating a plasma where a portion of the target is sputtered off the target material; and introducing a reactive gas comprising oxygen to form the oxide layer on the substrate.

8. For claim 36, Applicant requires a sputter coating system comprising at least one target material; an electrode having a channel-defining surface that contains at the at least one target material; and a source of non-laminarly flowing working gas.

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9. Stollenwerk discloses a substrate coating apparatus (abstract) and a method for using it (col. 4, l. 24-26). The method comprising providing a channel (area between items **1a** and **1b** in Figure 1) between targets in which gas flows through (Figure 1). The gas flows in a turbulent fashion and a plasma is formed so that target material is sputtered to deposit on the substrate (col. 3, l. 28-47). The reactive gas can flow into the chamber after the targets (col. 4, l. 49-59) and react with the magnesium to form magnesium oxide.

10. For claim 2, Applicant requires the gas to be formed by turbulence. As noted above, the gas is turbulent (col. 3, l. 28-47).

11. For claim 3, Applicant requires the gas to be formed by flowing a first portion of a gas in a first direction and a second portion in a second direction that is non-parallel with the first direction. Stollenwerk discloses providing turbulent flowing gas from two separate sources that are flowing in non-parallel directions (Figure 1; items **7** and **11**).

12. For claims 4 and 37, Applicant requires the gas to be formed by flowing the gas through at least two orifices in non-parallel directions. As can be seen from Figure 1, the gas is formed from more than 2 sources that emit the gas in non-parallel fashion.

13. For claims 5 and 38, Applicant requires the gas to flow through a series of orifices. Figure 1 shows the limitation.

14. For claim 6, Applicant requires the Reynolds number of the turbulence to be at least 2000. Because the gas flow is "turbulent", the Reynolds number is inherently greater than 2000. Applicant has specifically stated that "Typically, turbulent flow is characterized as having a Reynolds number greater than 2000." (See specification at page 7, lines 23-24).

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15. For claims 7 and 39, Applicant requires the channel surface to be part of a cathode. The targets are biased and therefore act as cathodes (col. 4, l. 41-44).

16. For claims 8 and 40, Applicant requires the channel to have a rectangular cross section. Figure 1 is in cross section and shows the channel to be rectangular.

17. For claim 9, Applicant requires the power to the target to be DC. Stollenwerk discloses the limitation (col. 4, l. 41-44).

18. For claims 11 and 24, Applicant requires the target to be metal or metal alloy. For claims 12 and 25, Applicant notes that the target can be magnesium. Stollenwerk discloses the target to be magnesium (col. 3, l. 31-32).

19. For claims 13, 31, 32, and 41, Applicant requires the target to be a first target material and a second target material opposite the first target material. Figure 1 shows the targets opposite each other.

20. For claims 14, 33, and 42, Applicant requires the first and second target material to comprise a metal or metal alloy. For claims 15, 34, and 43, Applicant notes that the target can be magnesium. Stollenwerk discloses the targets to be magnesium (col. 3, l. 31-32).

21. For claims 18 and 44, Applicant requires introducing a reactive gas into the chamber. Stollenwerk introduces oxygen or hydrogen (col. 4, l. 57-59).

22. For claims 19, 23, and 45, Applicant requires the reactive gas to be introduced at a position outside the channel. The reactive gas is introduced at a location so that the gas does not directly flow between the targets (col. 4, l. 51-53).

23. For claims 20 and 29, Applicant requires the reactive gas to be oxygen. For claim 21, the reactive gas is molecular hydrogen or molecular oxygen. For claim 30, the reactive gas can be

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molecular oxygen. When the hydrogen or oxygen reacts, the oxygen or hydrogen is converted to molecular state and thus is an active gas.

24. For claim 26, Applicant requires the oxide film to be magnesium oxide. Stollenwerk forms magnesium oxide (abstract).

Claim Rejections - 35 USC § 103

25. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

26. Claim 10 rejected under 35 U.S.C. 103(a) as being unpatentable over US 6,150,030 to Stollenwerk et al. (Stollenwerk) in view of US 5,810,982 to Sellers.

27. For claim 10, Applicant requires the power supply to the target to be pulsed DC power that is asymmetric bipolar.

28. Stollenwerk is described above, but does not disclose the power to be asymmetric bipolar.

29. Sellers discloses using asymmetric bipolar pulsed DC power for sputtering to prevent arcing that occurs when insulating films are sputtered (col. 4, l. 23-32).

30. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Stollenwerk to utilize asymmetric bipolar pulsed DC bias sputtering because of the desire to prevent arcing.

31. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over US 6,150,030 to Stollenwerk et al (Stollenwerk) in view of *Thin Film Processes* by Vossen et al. (Vossen).

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32. For claim 17, Applicant requires the target to comprise an electrically insulating block and a second electrically insulating block opposite the first block.

33. Stollenwerk is described above, but does not disclose the target to be an electrically insulating block. Stollenwerk does, however, reactive sputter deposit from a metal target.

34. Vossen discloses that reactive sputtering can be two art recognized equivalent methods. The first involves depositing from a metal target in a reactive gas atmosphere. The second involves depositing from a sputtering target of the same composition as the desired deposited layer in a reactive gas atmosphere. The only difference between the two reactive sputtering methods is the sputtering rate (pg. 48-49).

35. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Stollenwerk to utilize reactive sputtering from an insulating MgO target because of the knowledge that the method would be an art recognized equivalent.

36. Claims 1-9, 11-15, 18-43, and 47-54 rejected under 35 U.S.C. 103(a) as being unpatentable over US 5,889,295 to Rennie et al. (Rennie) in view of US 6,150,030 to Stollenwerk et al. (Stollenwerk).

37. Claims 1-9, 11-15, 18-26, 29-34, 36-43, 45, and 46 are described above. For claim 27, Applicant requires the at least one target to comprise zinc and the oxide to comprise zinc oxide. For claim 28, the target comprises aluminum. For claim 35, the oxide film is aluminum-doped zinc oxide.

38. For claim 47, Applicant requires a method for depositing a nitride film comprising providing a channel for a working gas to flow through that has the channel defined by at least one target material; flowing the working gas through the channel non-laminarly; generating a

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plasma where a portion of the target is sputtered off the target material; and introducing a reactive gas comprising nitrogen to form the oxide layer on the substrate. For claim 48, Applicant requires the reactive gas to be combined with the working gas while it is flowed through the channel. For claim 49, Applicant requires the reactive gas to be introduced at a position outside the channel. For claim 50, Applicant requires the target to comprise a metal or alloy or semiconductor. For claim 51, the metal can be aluminum or zinc. For claim 52, the nitride can be aluminum nitride. For claim 53, the target includes first and second target material. For claim 54, the target material is opposite each other.

39. Rennie discloses a method of manufacturing a semiconductor device (abstract) comprising forming a layer such as Al-doped ZnO or AlN by sputtering (col. 4, l. 32-55). The specifics of the sputtering process and apparatus are not described. It is inherent that if aluminum is deposited, as either a doping effect or as AlN, then aluminum is present in the sputtering target. Likewise, if ZnO is formed, then the target inherently contains zinc.

40. Stollenwerk discloses a sputtering apparatus and process comprising providing turbulent flowing gas. The benefit of using the method and apparatus of Stollenwerk is larger area substrates can be processed (col. 1, l. 1-67).

41. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Rennie to utilize the process and apparatus of Stollenwerk because of the desire to coat large area semiconductor substrates to produce numerous semiconductor chips.

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42. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over US 5,889,295 to Rennie et al. (Rennie) in view of US 6,150,030 to Stollenwerk et al. (Stollenwerk) as applied to claim 1 above, and further in view of US 5,810,982 to Sellers.

43. Claim 10 is described above. Rennie, Stollenwerk, and Sellers are described.

44. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Rennie in view of Stollenwerk to utilize asymmetric bipolar pulsed DC bias sputtering because of the desire to prevent arcing.

45. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over US 5,889,295 to Rennie et al. (Rennie) in view of US 6,150,030 to Stollenwerk et al. (Stollenwerk) as applied to claim 1 above, and further in view of *Thin Film Processes* by Vossen et al. (Vossen).

46. Claim 17 is described above. Rennie, Stollenwerk, and Vossen are described above.

47. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Rennie in view of Stollenwerk to utilize reactive sputtering from an insulating ZnO target because of the knowledge that the method would be an art recognized equivalent.

Allowable Subject Matter

48. Claims 16 and 44 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

49. The following is a statement of reasons for the indication of allowable subject matter: it is neither anticipated nor obvious over the prior art of record to have a method for sputter coating a substrate in a sputter coating reactor as claimed by Applicant in claim 16. It is also neither

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anticipated nor obvious over the prior art of record to have a sputter-coating system for coating a substrate as claimed by Applicant in claim 44.

50. The closest prior art is Stollenwerk, and Stollenwerk only utilized two separate targets. Using an additional third and fourth target would require hindsight.

General Information

For general status inquiries on applications not having received a first action on the merits, please contact the Technology Center 1700 receptionist at (571) 272-1700.

For inquiries involving Recovery of lost papers & cases, sending out missing papers, resetting shortened statutory periods, or for restarting the shortened statutory period for response, please contact Denis Boyd at (571) 272-0992.

For general inquiries such as fees, hours of operation, and employee location, please contact the Technology Center 1700 receptionist at (571) 272-1300.

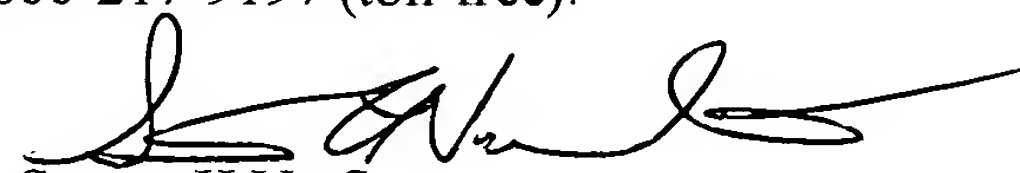
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Steven H. VerSteeg whose telephone number is (571) 272-1348. The examiner can normally be reached on Mon - Thurs (6:30 AM - 5:00 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X. Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Steven H VerSteeg
Primary Examiner
Art Unit 1753

shv
April 14, 2005